Amendments to the Claims:

This listing of the claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. (Canceled)

2. (Currently Amended) A diffractive optical element (DOE) comprising:

R×S lengthwise and crosswise aligning pixels $\{C_{mn}\}$ (m=1, 2, …, R; n=1, 2, …, S) of a size of a×b which have g (=2^s: s: integer) different values of thicknesses $\{d_{mn}\}$ varying within one wavelength of laser light λ and have g (=2^s: s: integer) different values of complex amplitude transmittance $\{t_{mn}\}$ given by $t_{mn}=\exp(j2\pi(n-1)d_{mn}/\lambda)$, where j is an imaginary number unit and where n is a diffractive index of the DOE,

complex amplitude W(α, β) of a beam diffracted in a direction of a horizontal angle α and a vertical angle β being calculated not by the Fast Fourier Transform but by,

$$W(\alpha,\beta)=\mathrm{sinc}\left(\frac{a\alpha}{\lambda}\right)\mathrm{sinc}\left(\frac{b\beta}{\lambda}\right)\sum_m\sum_n t_{mn}\exp\{-jk(ma\alpha+nb\beta)\}$$

where summations are carried out for all the pixels in the DOE and some or all of the diffraction beam angles (α, β) are ~~either on or off lattice~~ non-lattice points defined on an object plane,

in the case of diverging an incident laser beam into K diffracted beams, the k-th beam having angles (α_k, β_k) to an incident beam axis,

the angles (α_k, β_k) of the k-th diffracted beam (k=1, 2, …, K) satisfying equations,

$\sin\alpha_k=m_kU$,

$\sin\beta_k=n_kV$,

where m_k and n_k are integers having no common divisor and U and V are the positive greatest common divisors (measures) for $\{\sin\alpha_k\}$ and $\{\sin\beta_k\}$ for k=1, 2, …, K, and

both or either of the greatest common divisors U and V being smaller than a quotient λ/aR or λ/bS of the laser wavelength λ divided by a size aR or bS of the DOE, that is,

$U < \lambda/aR$,

$V < \lambda/bS$.

3. (Currently Amended) The diffractive optical element according to ~~claim 1 or~~ claim 2, wherein the DOE is a Fraunhofer type DOE having an infinitely long focal length ~~(f=∞ or f=-∞)~~ (f=∞).

4. (Currently Amended) The diffractive optical element according to ~~claim 1 or~~ claim 2, wherein the DOE is a Fresnel type DOE having a ~~finite~~ definite focal length ~~(-∞<f<∞)~~ (f < ∞).

5. (Canceled)

6. (Currently Amended) The diffractive optical element according to any one of ~~claims 1 to 5~~ claims 2 to 4, wherein calculations of diffracted beam intensity are carried out by summing the whole terms of all the pixels and calculations of noise are carried out the Fast Fourier Transform for alleviating noise calculation time, and the transmittance distribution $\{t_{mn}\}$ is determined for satisfying a restriction of desired diffraction beam intensity and another restriction of reduction of noise.

7. (Canceled)

8. (Canceled)